

No. 43

FRANKLIN IN

REPORT OF THE COMMITTEE

Science and the Arts.

On Catherine L. Gibbon's

Improvement in Street  
Railway Construction

Application filed, June 16<sup>th</sup>. 1871

Committee appt'd, July 30<sup>th</sup> 1871

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a P. Pistor ☒ Chairman,

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Report submitted, December 21, 1871.

" Read 2d time, 1872

" Approved, 1872



NO. 1643.

HALL OF THE FRANKLIN INSTITUTE,

Philadelphia, April 1st., 1892.

The Sub-Committee of the Committee on Science and the Arts, constituted by the FRANKLIN INSTITUTE of the State of Pennsylvania, to whom was referred for examination:-

GIBBON'S DUPLEX STREET RAILWAY TRACK,

REPORT,

That the system embraces a form of construction for street railways that dispenses entirely with wooden sills and cross-ties; and substitutes therefor Metal chains and tie-bars as supports and braces for a system of double rails of peculiar construction, in which the head and flange rails are separate, each having a wide depending web directly under the load-bearing surface. These two sections, when united form a complete rail, making a very stiff longitudinal stringer, laid to break joints, so that when the head sections meet they are supported <sup>by</sup> the solid portion of the flange section, and where the latter join they are covered partially by the solid head section, thus practically forming a jointless track of uniform strength and elasticity throughout its entire length.

A transverse section of this track exhibits two double rails -- two cast iron chains, one tie-bar and two



lock wedges, as shown in the accompanying illustrations.

It will be noted that no spikes or threaded bolts are used, that the gauge of the track is absolutely uniform and permanent, being controlled by the notched tie-bars which receive the webs of the rails. Two patterns of cast iron chairs are preferably used, the joint chair, having slots and key-ways to receive two tie-bars and two key wedges, and an intermediate chair having but a single tie bar, slot, and key-way.

The tie bars are made from flat steel about 2" X 1/2" notched at each end to any desired gauge to receive the webs of the rails.

The keys or wedges are split at one or both ends which being driven through the key-ways of the chairs directly over the tie-bars, and through openings in the webs of the rails, are securely held in place by slightly spreading the split ends, so that they will not come out accidentally but are not difficult to remove when necessary.

The claims of superiority advanced for this system are fully discussed and illustrated in the letters patent, Nos. 429,127 and 429,128, dated June 3d., 1890, and other papers hereto attached, and in other papers forming an appendix of reference but briefly stated they appear under the following heads.

- 1:- "Durability and permanence, inherent to an all metal system." This claim passes without question.
- 2:- "Smoothness and stability of the track which is abso-



lutely free from weak joints."

When a track is constructed so that the ends of the rails cannot yield to the passing load, the worst of all track destroying causes is removed, and such a road must retain its smoothness and stability, until the rails are entirely worn out throughout their length.

- 3:- " Increased vertical and lateral strength without increase of metal."

The double rail with the two vertical webs, combined and secured by the metal chairs, tie-bars, and wedges, is naturally very stiff, in all directions:- this is mainly due to the better disposition of the metal with relation to the direction of the load and strain.

- 4:- " Freedom from torsional ~~strain~~ strain, the bearing surfaces being directly supported by the vertical webs."

The prevailing form of street track in America, provides for two kinds of service, a head to carry the car and a flange upon which other vehicles may run.

In single girder rails, the one vertical web is not placed directly under either of these load bearing portions, but between them, so that there is no direct support for either car or wagon, which brings upon such a track a serious and injurious twisting strain. In the Gibbon rail, which has the two vertical webs directly under each of the load bearing surfaces, similar



twisting is impossible.

5:- " Increased wearing capacity of head rail."

On tracks constructed so that wagons cannot travel upon them, or where the wagon travel is much lighter than the car service, the head of the rail will wear out most rapidly, when this occurs upon a single girder rail the entire rail must be discarded as scrap, while with the Gibbon system, only the head rail need be renewed, and the discarded part is but half the weight of the single girder.

6:- " In renewal, the discarding of the worn portion only is necessary."

The advantage of retaining either half of the rail in service until it is worn out, adds greatly to the life and economy of such a track.

7:- " Perfect alignment and accurate maintenance of gauge with requisite freedom for expansion and contraction."

The union of the rails with the tie-bars and keys at the chairs is such that while the rails are firmly seated in the chairs, and securely held down by the keys, the eyes in the rail-webs being longer than the width of the keys, ample play for expansion is provided.

8:- " Simplicity of construction which expedites the track laying and reduces the disturbance of the public streets."



Every piece of the Gibbon track is of the simplest form and inexpensive to make, and in the construction of a mile of track but 7850 pieces are required, while some of the permanent single girder tracks are made up of over 26,000 pieces and the common tram rail uses 17,406 pieces per mile. In excavating for these tracks the quantity of earth to be removed bears about the same ratio, viz:- for the Gibbon track 300 cubic yards, and for the others 1064 cubic yards, and 932 cubic yards respectively -- These advantages bring the cost of the superior all metal Gibbon track within the cost of the ordinary tram track.

9:- " Maintenance of absolute contact of metal, which obviates the necessity of "bonding joints" for electrical traction."

This claim is doubtless well founded, the method of connecting the rails at their ends is such that for electrical service the track is found to be practically and permanently as one continuous rail.

10:- " A reasonable first cost, and great saving in maintenance. For ~~xxx~~ reasons above stated, this claim must be conceded.



From a careful examination of this system and inspection of tracks in practical use, it is evident that much that has long been desired in the direction of a better and more lasting construction, permanent smoothness, and strength equal to the heavy traffic that they are subject to, has been carefully and ably worked out upon a thoroughly practical and economical line in every detail. The special requirements of electrical traction and cable service appear to be fully met, so that we have an excellent substitute for every ~~other~~ objectionable form of track now commonly used.

An invention that will contribute so much to the daily comfort of every one who must use the street cars and that at the same time materially reduces the annoyances of the ~~excess~~ ever recurring repairs to the present prevailing systems, commends itself to the highest appreciation of all.

We therefore respectfully recommend *this grant to the inventor the award of the John Smith Legacy Premium & Medal.*

Adopted:

*Arthur Beardsley,*  
Chairman of Committee on Science and the Arts

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*J. M. Emanuel*  
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